

former, and demands that reason shall be shown for not diverting to the service of the latter at least a large share of attention.

Remembering that measurement of arcs and elaborate study of the earth's irregularities by the plumb-line never can extend much beyond the continents and larger islands, and never will extend far in advance of civilisation; while pendulums can, and assuredly will some day, form part of the equipment of every scientific exploring party, it does seem passing strange that we should still be discussing the ratio of the axes of a convenient figure of reference (p. 287) as a more important question than the actual nonconformity of the earth to *some* approximate figure of known form.

What we would fain see, as the *geodetical* fruit of first-class surveys—if not done, then attempted; and if not even attempted, then at least inculcated as to be done or attempted—is, a comparison of the earth's surface, as actually measured, with some provisionally adopted form, showing where possible the relative position of the actual zenith, as determined by astronomical observations, with respect to the formal zenith. And then, a discussion of such results, showing, either a traceable continuity of the irregularities of the actual surface, if such exists; or evidence of discontinuity such as to justify a presumption that the irregularities are too small in area to be susceptible of study without closer distribution of stations.

Thus we might haply arrive at one of two conclusions—that large irregularities exist which may be mapped, or that the irregularities are such as to demand special investigation by a recurrence to observation in selected localities.

If to this suggestion it is objected that the thing has been done—and we know that the irregularity in the neighbourhood of Moscow has been investigated in some such way—we reply that, even so, a short paragraph noticing the fact (p. 288) is but a meagre presentation of what seems to us one of the principal results of methodic geodesy.

And now that we have done and have to lay down the pen, it is with a feeling of regret and a sense of incompleteness. The book deserves so much better than we have said of it. We have identified ourselves too entirely with the student looking for special instruction and too little with the author giving the best he had, and have quarrelled with him because it was too good for our needs. Once more be it said that the subject is too large for a single work—it needs a series. It is but the absence of a few apologetic words that has given this sense of a subject approached at many points only as it seems to be immediately quitted, in favour of others which have more attraction to the author. Now that he has dwelt on them, may he resume his task, and enlarge where we have shown the need.

J. HERSCHEL

OUR BOOK SHELF

The Fauna of Scotland, with Special Reference to Clydesdale and the Western District—Mammalia. By E. R. Alston, F.L.S. (Glasgow: The Natural History Society of Glasgow.)

THE Natural History Society of Glasgow, having resolved to publish a catalogue of the fauna of the western district

of Scotland, have secured the co-operation of Messrs. Alston, Young, Cameron, Robertson, Binnie, and Lumsden. Already one part of the catalogue of the Crustacea and one part of the catalogue of the Hymenoptera have been issued, and these have now been followed by the present part, treating of the Mammalia. The Society is doing a good work, and will be fortunate if all the parts as published come up to the standard of the one now before us. In the nomenclature of the Mammals, of which fifty-one are recorded, the author endeavours to reconcile the spirit and the letter of our British Association rules. Without entering into any details of description or economy, he has carefully worked out the geographical distribution of each species. A very interesting list is given of extinct and recent Scottish Mammals, arranged in the probable order of their arrival from the southward.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Auroral Response in America

WHEN the full burst of auroral displays is upon us, and one brilliant demonstration treads close on the heels of another, there may be some trouble in ascertaining which corresponds to which on opposite sides of the earth. But the opening of the new cycle-season by the arc which I described in your pages on March 17, has proved so isolated a phenomenon in time, that it cannot be confounded with any other either before or since. And while your subsequent notice of the disturbance of the magnets at the Royal Observatory, Greenwich, on the same night, proved that the aurora seen in Edinburgh was an earth-ball phenomenon, and not a mere local atmospheric glimmer, the following letter, which has just reached me from Canada, shows a remarkable correspondence to have prevailed there.

The letter, written to me by Lieut.-Col. G. E. Bulger, late 10th (North Lincoln) Regiment, from Montreal on April 10, is worth for word simply thus:—

"I have noticed your account (NATURE, vol. xxi, p. 492) of the aurora seen in Edinburgh on the 17th ult.; and it has occurred to me that it might interest you to hear of a similar display which I observed at this place on the same date. Your description would apply very well to the one witnessed here, excepting that the arch was higher in the sky, and its centre about N.E. The darkness below the light was very marked, although the moon was shining brightly at the time. Auroras have been singularly rare here this year, and that referred to is the only one I have seen or heard of since my arrival in August last. The weather on March 17 was bright and fine, with detached clouds, and a light N.W. breeze. The barometer (aneroid) at 9 p.m. was 30.36, therm. 14.7."

Thus far Col. Bulger; and now we have only to wait the arrival of Australian meteorological reports to ascertain whether south responded to north, as well as west to east, on the occasion of that remarkably isolated auroral display, abundantly observable, yet observed by so very few persons, in this country on March 17 last.

PIAZZI SMYTH

15, Royal Terrace, Edinburgh, April 26

The Antiquity of Oceanic Basins

I AM much obliged to my friend Prof. Alex. Agassiz for reminding me that his distinguished father, when reporting on the deep-sea dredgings carried on by the United States Coast Survey in 1866-68, explicitly endorsed the views previously put forth by Prof. Dana (to whom, however, he made no reference) as to the geological antiquity of the American Continent and the probable determination of the general outlines of the present Continental elevations and Oceanic depressions at the very beginning of the formation of inequalities upon the Earth's surface.

Prof. Alex. Agassiz must have strangely misread that paragraph in my lecture in which I refer to the two deepest soundings of the *Tuscarora* if he supposes that I intended to cast any doubt upon their trustworthiness as indicating "depths considerably exceeding 4,000 fathoms." In the Official Report, now before me, these two soundings are thus recorded:—

"No. 15: 4,643 fathoms. No specimen (of bottom). Wire broke. Bottom not reached.

"No. 33: 4,655 fathoms. No specimen. Wire broke."

As there is no mention in the second case of the wire having broken in reeling-in (which is stated in several other cases), and as the length of wire run out corresponded almost exactly with that run out in the first, it was not unnatural that I should suppose that the wire broke by its own weight without reaching bottom. But I expressly cited these two soundings, incomplete though they were (no specimen of bottom having been brought up), as evidence in support of my case that those "gigantic pit-holes," in which extraordinary depths have been encountered, occur in regions of great Volcanic activity.

56, Regent's Park Road, WILLIAM B. CARPENTER
N.W., April 27

Seeing by Electricity

WITH respect to the letter of Messrs. Ayrton and Perry (*NATURE*, vol. xxi. p. 589), in which they propose to utilise for this purpose Dr. Kerr's discovery of the rotation of the plane of polarisation of light reflected from the pole of a magnet, will you allow me to give you some details of a repetition of Dr. Kerr's experiment which I made a year or two ago.

I used an electromagnet consisting of an iron bar 2 feet 4 inches long and 2½ inches diameter, surrounded by 70 lbs. of wire, and excited by ten Grove cells.

The total double rotation produced, not by slightly altering the resistance, but by reversing the current, was never more than 26' (twenty-six minutes of arc).

To see this at all with a very delicate Jellet analyser, it was necessary for the observer to increase the sensitiveness of his eye by sitting in total darkness for some ten minutes before each observation.

Your readers can judge what chance of obtaining visible changes of illumination there would be with "little" magnets and mere variations in a current not powerful enough to fuse a selenium resistance.

J. E. H. GORDON
32, Elvaston Place, Queen's Gate, S.W., April 22

Ophiopsis mirabilis

THE statement concerning Prof. Martin Duncan's *Ophiopsis mirabilis* contained in the review of Prof. Lyman's account of the *Challenger* Ophiurans was not intended to represent an expression of opinion of the Reviewer upon the matter, but simply the conclusions of Prof. Lyman as expressed in the memoir under review. The matter was not cited as a question of mistake, but of difference of opinion between two experts. Prof. Lyman enters, in the memoir referred to, at some length into his reasons for considering Prof. Duncan's species, as described, to be a true *Ophiopholis*. This latter genus Prof. Lyman thinks quite remote from *Ophiopsis*, in spite of the evidence adduced by Prof. Duncan. I am sorry that I did not make it clear that I was citing Prof. Lyman's opinion and not expressing any judgment of my own.

THE REVIEWER IN QUESTION

The Ōmori Shell-Heaps

DESIRING as much as possible to save space and avoid rhetoric, I shall be content to reply to the pith of Prof. Morse's amusing diatribe contained in *NATURE*, vol. xxi. p. 501, principally by citing extracts from a recent paper on Prehistoric Remains in Japan, read by Prof. Milne before the Asiatic Society of Japan, and printed, together with a report of the discussion it gave rise to, in their *Transactions*, published in February last, which I received about a fortnight ago.

The main object of my note in *NATURE*, vol. xxi. p. 350, was to show that the antiquity claimed by Prof. Morse for the Ōmori mounds was not warranted by the facts. In this view I am supported by Prof. Milne, Dr. Faulds, and Mr. Aston, whose united authority I venture to prefer to that of the Salem zoologist.

Prof. Milne examined a number of shell-mounds in various parts of Japan, both in Yezo, where the Aino race still flourishes,

and in the main island, including the Ōmori heaps, but he does not mention having met with any human remains in any of them. Adverting to Prof. Morse's conclusions from his examination of the Ōmori shells, which may be briefly presented thus:—

That changes have taken place in the relative abundance, size, and proportions of certain species and in the extinction of certain species.

Prof. Milne quotes from the Memoir: "The modification in the relative size, &c., is profound, and seems to indicate" either a shorter period of species-variation than is commonly admitted, "or else that the deposits presenting these peculiarities have a much higher antiquity than had before been accorded them." Prof. Milne (but then he is merely a "Briton in Japan," and *quâ* such disposed, doubtless, in the eyes of Prof. Morse, to sneer at everything Japanese, shell-mounds included) is inclined to think these modifications "in great measure due to the great changes which have been taking place in Yedo Bay during recent times." The italics are Prof. Milne's. "... The bay is rapidly silting up. . . during the last 800 years large cities have sprung up round its shores, all of which have added something to destroy the purity of its shallower waters. All these causes combined are and have been making changes in physical conditions, and with them we should naturally expect a rapid change in the faunæ which are dependent on them." Further on a map is given showing the ancient coast lines at and near Yedo, and proving the magnitude and rapidity of the various successive encroachments of the shores upon the waters of the bay.

Again, "The conclusion to which I am led with regard to the shell-heaps is that they are of Aino origin . . . the positions which these shell-heaps occupy are on spots which we know . . . were once tenanted by Ainos, and even down to the end of the twelfth century Ainos were living in Nippon." By Nippon is meant, I presume, the main island. I may add that I have often heard from Japanese of Aino colonies still existing in the north-eastern districts of the main island, but not distinguishable by language, or customs, or otherwise than physically from their Japanese neighbours. The average advancement of the land at and near Yedo, Prof. Milne states as varying from 38 feet to 2 feet per annum, which would account for the present distance of the Ōmori heap from the shore being attained in from something under 100 to something over 1,000 years. Mr. Aston, in the course of the discussion which followed the reading of Prof. Milne's paper—I quote from the report in the *Transactions*—"was glad to observe a tendency to diminish the antiquity which had been earlier assigned to these remains (from Ōmori) by some of the writers on the subject. Civilisation in Japan is a product of much more recent growth than in Europe, and we do not require to go so far back in order to meet with tokens of a primitive degree of advancement." Mr. Aston then showed that in the middle of the eighth century a large portion of the main island was exclusively Aino. Dr. Faulds assigned "600 years as the probable antiquity of the Ōmori heap," and Prof. Milne in reply said that the rise of land variously evidenced round Yedo Bay, "taken in conjunction with the vast deposits of silt which are brought down by the various large rivers which flow into the bay, would make the changes in coast-line exceedingly rapid."

With regard to the pottery of the Ōmori heaps, Prof. Milne says: "The designs are in very many instances similar to the designs which are carved by the Ainos of the present day." On this point Dr. Faulds's testimony is more emphatic. "The 'mat' impressions figured by Prof. Morse in Plate V. Fig. 1, are to be found repeated in the most recent pottery;" the types of pottery in the shell-heaps did not seem "to be separated by any one well-marked character from contemporary pottery of a low grade. The shell-heaps scattered along the old and recent coasts of Yedo Bay presented in their fragments of pottery a series of modifications leading up to recent times, and some of the heaps may be seen in actual process of accumulation." Further, Mr. Ninagawa of the Tokio Museum, the principal authority on the subject of Japanese pottery, decides that the "remains . . . cannot be older than 1,000 years." Dr. Faulds showed some coarse pottery of the day not dissimilar to that of the shell-heaps, and was not even prepared "to accept finally the belief that the Ainos were the founders of these heaps."

From personal investigation of many remains of shell-heaps on the coast-line and inland between Yedo and Yokosuka, I can corroborate Dr. Faulds's statement. I do, however, believe that the heaps at Ōmori were the handiwork of Ainos, very